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(54) Title: LOW COST, HIGH AVERAGE POWER, HIGH BRIGHTNESS SOLID STATE LASER

(57) Abstract

A high average power, high brightness solid state laser system. We first produce a seed laser beam with a short pulse duration. A laser amplifier (24) amplifies the seed beam to produce an amplified pulse laser beam which is tightly focused to produce pulses with brightness levels in excess of 10^{11} Watts/cm². Preferred embodiments produce an amplified pulse laser beam having an average power in the range of 1 kW, an average pulse frequency of 12,000 pulses per second with pulses having brightness levels in excess of 10^{14} Watts/cm² at a 20 micrometers diameter spot which may be steered rapidly to simulate a larger spot size. Alternately, a kHz system with several (for example, seven) beams (from amplifiers arranged in parallel) can each be focused to 20 micrometers and clustered to create effective spot sizes of 100 to 200 micrometers. These beams are useful in producing X-ray sources for lithography.